one or more devices for distribution of continuous commingled threads disposed above said conveyor [, downstream];

a second device disposed downstream of said conveyor and provided with a small barrel supporting at least two rolls of fabric followed optionally by a second device for distribution of continuous thread or by a cutter and by a device for distribution of chopped threads[,];

a preheating oven placed at the end of the conveyor[,]; and

a twin-belt press comprising heating drums in its upstream portion, cooled rolls in its downstream portion and, in its central portion, a heating zone followed by a cooling zone, and, lastly, an automatic guillotine device.--

REMARKS

Favorable reconsideration of this application, as presently amended, is respectfully requested.

Claims 1 and 5-14 are now active in this application, Claims 1, 6 and 14 having been amended by the present amendment.

In the outstanding Office Action, Claims 1 and 5-12 were rejected under 35 U.S.C. §112, first paragraph, as containing subject matter not described in the specification; Claims 1 and 5-12 were rejected under 35 U.S.C. §112, second paragraph, as being indefinite; and Claims 1 and 5-14 were rejected under 35 U.S.C. §103(a) as being unpatentable over either Murphy (U.S. Patent 4,410,385) or U.K. 2093768 further in view of O'Conner (U.S. Patent 4,800,113), E.P. 408,898 and either Li et al. (U.S. Patent 5,149,391) or Koba et al. (U.S. Patent 5,201,979).

In response to the rejections under both 35 U.S.C. §112, first and second paragraphs, the noted term "loose" has been removed from Claim 1 and replaced with the phrase "at least one of continuous threads deposited in a moving direction of said moving conveyor, continuous threads deposited in a form of superposed loops, and chopped glass threads" as described, for example, in page 5, lines 27-31 of the specification. Hence, Claim 1 is believed to be in full compliance with the statutory language of 35 U.S.C. §112, first and second paragraphs.

Claim 6 has been amended to be consistent with the amended Claim 1 while Claim 14 has been amended to clarify the subject matter recited therein. Thus, Claims 6 and 14 are not believed to raise a question of new matter.

Briefly recapitulating, conventional methods for the manufacture of a composite material suffer from a limited amount of reinforcing fibers which can be deposited during manufacturing process.[1] Claim 1 of the present application is directed to a method for continuously manufacturing a composite product by associating glass threads and a thermoplastic organic material in a filamentary state. For example, referring to the non-limiting embodiments of Figures 1-3, a method for continuously manufacturing a composite product according to Claim 1 includes depositing onto a moving conveyor two layers in either order, where one of the layers is made of at least one of continuous threads deposited in a direction of movement of the moving conveyor, continuous threads deposited in a form of superposed loops, and chopped threads, at least 80% by weight thereof being commingled threads consisting of glass filaments and of filaments of thermoplastic organic material which are intimately blended, a quantity of glass deposited representing more than 40% by weight

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[1] Specification, page 3, lines 8-13 and page 15, lines 7-11.

of the total quantity of material deposited in a form of glass threads and of organic material, and the other layer is a strip of fabric formed by glass threads of which at least a portion thereof are commingled threads consisting of glass filaments and of filaments of thermoplastic organic material, transferring this glass threads-organic material combination into a number of zones where the combination is heated, compressed and cooled, the heating and cooling of the combination being simultaneously accompanied by its compression, and cutting up the combination in a form of sheets or in winding it onto a rotating drum. By depositing at least one of continuous threads deposited in a direction of movement of the moving conveyor, continuous threads deposited in a form of superposed loops, and chopped threads to combine with a layer of a fabric strip containing commingled threads of glass and thermoplastic filaments, the method according to Claim 1 of the present invention makes it possible to continuously manufacture a composite material whose content of reinforce fibers is exceedingly high.[2] In addition, because of the glass threads contained in the continuous threads deposited in a direction of movement of the moving conveyor, continuous threads deposited in a form of superposed loops, and chopped threads and the layer of a fabric strip formed by glass threads containing commingled threads of glass and thermoplastic filaments, lamination of the fabric strip and the continuous threads deposited in a direction of movement of the moving conveyor, continuous threads deposited in a form of superposed loops, or chopped threads readily promotes a high content of reinforcing fibers throughout the composite product. As a result, the continuous manufacturing method of the present

[2] Id. page 15, lines 7-11.

invention allows to produce composite products whose strength is equal or higher than those manufactured simply by increasing glass content.[3]

Murphy merely discloses a method of making a composite article from multiple layers of fabric and does not teach a process for continuously manufacturing a composite product by depositing a layer made of at least one of continuous threads deposited in a direction of movement of the moving conveyor, continuous threads deposited in a form of superposed loops, and chopped threads whose at least 80 %wt. consisting of commingled threads of at least 40 %wt. glass and thermoplastic filaments, and a layer of a fabric strip formed by glass threads containing commingled threads of glass and thermoplastic filaments. Thus, Murphy does not obviate the specific process recited in Claim 1.

Likewise, U.K. '768 fails to teach a process for continuously manufacturing a composite product by depositing a layer made of at least one of continuous threads deposited in a direction of movement of the moving conveyor, continuous threads deposited in a form of superposed loops, and chopped threads whose at least 80 %wt. consisting of commingled threads of at least 40 %wt. glass and thermoplastic filaments, and a layer of a fabric strip formed by glass threads containing commingled threads of glass and thermoplastic filaments while disclosing a method for laminating fabric plies woven from reinforcing fibers and thermoplastic fibers. Nowhere in U.K. '768 discloses commingled threads which is made of an intimate mixture of the strengthening filaments and the thermoplastic organic filaments. Hence, U.K. '768 does not obviate the specific process recited in Claim 1 either.

O'Connor discloses a method of producing a composite product using co-mixed fibers either in the form of a fabric or in the form of a chopped strand mat. However, O'Connor

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[3] Id. lines 28-38.

does not teach a process for continuously manufacturing a composite product by depositing a layer made of at least one of continuous threads deposited in a direction of movement of the moving conveyor, continuous threads deposited in a form of superposed loops, and chopped threads whose at least 80 %wt. consisting of commingled threads of at least 40 %wt. glass and thermoplastic filaments, and a layer of a fabric strip formed by glass threads containing commingled threads of glass and thermoplastic filaments. Instead, O'Connor merely teaches how to produce fiber reinforced thermoplastic articles from thermoplastic filaments and reinforcing fibers. To that end, the O'Connor method includes the steps of "intermingling" filaments of thermoplastic and continuous filaments of reinforcing fibers, weaving these filaments into a fabric, and heating the fabric.[4] Although, by commingling the thermoplastic and reinforcing filaments, the O'Connor method teaches how to provide adequate contact between the thermoplastic and reinforcing filaments, O'Connor fails to teach not only the layer of a fabric strip formed by glass threads containing commingled threads of glass and thermoplastic filaments but also adequate contact between such a layer and the layer made of at least one of the continuous threads deposited in a direction of movement of the moving conveyor, continuous threads deposited in a form of superposed loops, and chopped threads consisting of the thermoplastic and reinforcing filaments. Furthermore, although the outstanding Office Action asserts that O'Conner teaches glass threads to be chopped in order to form a nonwoven matt or batting, O'Conner does not suggest glass threads in the continuous threads deposited in a direction of movement of the moving conveyor, continuous threads deposited in a form of superposed loops, or chopped threads to be directly laminated with a fabric strip also formed partially by glass filaments. To maintain a rejection under 35

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[4] O'Conner, columns 6-7.

U.S.C. §103(a), there must be some motivation or suggestion in the applied references to select the components of an invention.[5] Nevertheless, none of Murphy, U.K. '768 and O'Conner suggest combining glass threads contained in the continuous threads deposited in a direction of movement of the moving conveyor, continuous threads deposited in a form of superposed loops, or chopped threads with a fabric strip formed by the glass threads wherein the glass threads are commingled threads consisting of glass and thermoplastic filaments for the purpose of increasing the content of reinforcing filaments in a composite material. The obviousness rejection in the Office Action therefore predicates its assertion upon impermissible hindsight of Applicants' invention as a guide. Accordingly, O'Connor does not obviate the specific process recited in Claim 1.

Applicants also wish to point out that Murphy, U.K. '768 and O'Conner neither describe nor suggest a process for continuously fabricating a composite whose rate of strengthening is greater than 40% by weight. A process for continuously manufacturing a composite product by associating glass threads and a thermoplastic organic material in a filamentary state according to the present invention produces a continuous composite product which does not require any extra preliminary connecting or joining processes. Instead, a continuous composite product manufactured according to the present invention is ready to be cut, molded or deposited directly for its desired use, thereby permitting the composite product to take a very complex shape while maintaining the same reinforcement ratio throughout the composite product in its final form. Also, because the reinforcement and the thermoplastic organic material are firmly combined in this process, the composite product is very

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[5] See In re Baird, 29 USPQ2d. 1550 (CAFC 1994); In re Jones, 21 USPQ2d. 1941 (CAFC 1992).

homogenous despite its high reinforcement ratio and a time for molding the composite product into its final shape is considerably reduced at the same time.

Both Li et al. and Koba et al. disclose a use of conveyor belt in the art of forming fiber reinforced thermoplastic composites, but do not teach a process for continuously manufacturing a composite product by depositing a layer made of at least one of continuous threads deposited in a direction of movement of the moving conveyor, continuous threads deposited in a form of superposed loops, and chopped threads whose at least 80 %wt. consisting of commingled threads of at least 40 %wt. glass and thermoplastic filaments, and a layer of a fabric strip formed by glass threads containing commingled threads of glass and thermoplastic filaments. Thus, neither Li et al. and Koba et al. do not obviate the specific process recited in Claim 1.

Since none of Murphy, U.K. '768, O'Conner, Li et al. and Koba et al. teach a process for continuously manufacturing a composite product by depositing a layer made of at least one of continuous threads deposited in a direction of movement of the moving conveyor, continuous threads deposited in a form of superposed loops, and chopped threads whose at least 80 %wt. consisting of commingled threads of at least 40 %wt. glass and thermoplastic filaments, and a layer of a fabric strip formed by glass threads containing commingled threads of glass and thermoplastic filaments, even the combined teachings of these applied references would not in any way obviate the specific process recited in Claim 1. Accordingly, Claim 1 is patentably distinguishable and thus believed to be allowable over Murphy, U.K. '768, O'Conner, Li et al. and Koba et al.

Additionally, because Claims 5-12 depend directly or indirectly from Claim 1, substantially the same arguments set forth above apply to these dependent Claims. Hence, Claims 5-12 are also believed to be allowable.

Similarly, though in independent form, Claims 13-14 are directed to apparatus embracing the subject matter recited in Claim 1, and thus substantially the same arguments set forth above apply to these independent Claims. Therefore, Claims 13-14 are believed to be allowable as well.

Consequently, it is respectfully submitted that the references of record whether taken individually or in combination do not obviate the process which is fully disclosed and positively claimed in the present application. On that ground, it is respectfully submitted that the inventions defined by each of Claims 1 and 5-14 are patentable and a favorable reconsideration and early allowance of the present application to that effect is respectfully requested.

Respectfully submitted,

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